

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

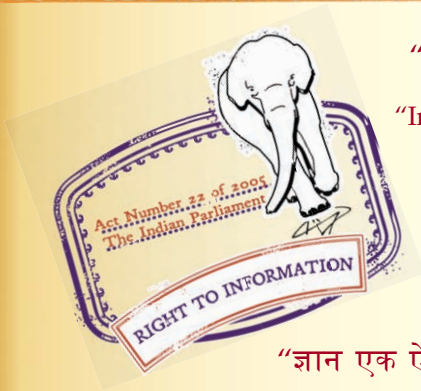
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 10106-4-3 (1984): Packaging code, Part 4: Packages,
Section 3: Plastics [TED 24: Transport Packages]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



IS : 10106 (Part 4/Sec 3) - 1984

Reaffirmed 1989

Indian Standard

PACKAGING CODE

PART 4 PACKAGES

Section 3 Plastics

“पुनर्पुष्ट १९८४”
“RE-AFFIRMED 1984”

UDC 621.798.151 [678.5/.8]



© Copyright 1984

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

PACKAGING CODE

PART 4 PACKAGES

Section 3 Plastics

Packaging Code Sectional Committee, MCPD 24

Chairman

SHRI M. R. SUBRAMANIAN

Representing

Indian Institute of Packaging and Transport,
Packages Sectional Committee, MCPD 18, ISI

Members

SHRI H. S. AGARWAL

Ministry of Railways (Railway Board)

SHRI R. K. GUPTA (Alternate)

SHRI S. P. KOHLI (Alternate)

SHRI A. S. ATHALYE

Technology Transfer, Bombay
Directorate of Standardization (Ministry of
Defence), New Delhi

SHRI J. BANERJEE

SHRI A. N. SRIVASTAVA (Alternate)

SHRI S. P. CHATTERJEE

India Foils Ltd, Calcutta

SHRI B. R. DAVE

The Chief Controllerate of Explosives, Nagpur

SHRI R. N. GANJOO

BASF India Ltd, Bombay

SHRI B. JOSHI (Alternate)

SHRI S. K. KESHAVA

I. T. C. Limited, Calcutta

SHRI A. C. SEKHAR

Wood and Wood Products Containers Sectional
Committee, MCPD 16, ISI

SHRI C. K. SOMANY

Hindustan National Glass & Industries Ltd,
Calcutta

SHRI R. K. GUPTA (Alternate)

SHRI K. H. PARIKH (Alternate)

DR K. K. TALWAR

The Paper Products Ltd, New Delhi

DR RAVI TALWAR (Alternate)

SHRI H. K. UPADHAYAYA

Larsen & Toubro Ltd, Bombay

SHRI K. VISWANATHAN

Paper & Flexible Packaging Sectional Committee,
MCPD 14, ISI

SHRI P. S. DAS,

Director (MCPD)

Director General, ISI (*Ex-officio Member*)

Secretary

SHRIMATI SHASHI SAREEN
Deputy Director (MCPD), ISI

© Copyright 1984

INDIAN STANDARDS INSTITUTION

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

Indian Standard

PACKAGING CODE

PART 4 PACKAGES

Section 3 Plastics

0. FOREWORD

0.1 This Indian Standard (Part 4/Sec 3) was adopted by the Indian Standards Institution on 31 January, 1984, after the draft finalized by the Packaging Code Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 The Packaging Code is being issued in the following parts, each having one or more sections:

- Part 1 Product packaging
- Part 2 Packaging materials
- Part 3 Ancillary materials
- Part 4 Packages
- Part 5 Packaging operations
- Part 6 Storage and transportation
- Part 7 Packaging machinery
- Part 8 Testing

0.2.1 This section of the packaging code (Part 4/Sec 3) deals with plastics packages. The properties and characteristics of plastics materials are described in Section 3 of Part 2, of the Packaging Code.

0.3 Development of plastics containers is making rapid strides in the packaging industry. These containers are replacing the conventional containers such as metal and glass by virtue of their inherent advantages of light weight, strength and inert quality. Plastics containers are already in wide use in the food and drink, chemical, dairy, pharmaceutical, cosmetic and other industries. A plastics container may be accepted for packing a particular item or material provided its properties are compatible with those of its contents. It is technically possible to find a plastics material suitable for the manufacture of a container for almost any given product, although this may not always be economically practicable.

0.4 In this section of the code, plastic containers being currently used are described and both their types and methods of manufacture are given. This code is, therefore, intended to assist the users of plastics containers in the choice of the container most suitable for his purpose. A complete list of Indian Standards relating to plastic packaging is given in Appendix A.

0.5 In the preparation of this standard considerable assistance has been derived from BS 1133 : Section 22 : 1967 'Packaging code : Packaging in plastic containers', issued by the British Standards Institution (BSI).

1. SCOPE

1.1 This section (Part 4/Sec 3) of the code lays down general guidelines on the use of packaging containers made of plastics materials.

2. TERMINOLOGY

2.1 For the purpose of this code the definitions given in IS : 7019-1982* and IS : 2828-1964† shall apply.

3. CHARACTERISTICS OF PLASTICS MATERIALS

3.1 The selection of type of plastics material for the container depends upon its properties. For details of these reference may be made to Section 3 of Part 2 of this code.

4. PRINCIPAL METHODS OF MANUFACTURE

4.0 The method used in the manufacture of a container depends to some extent on the nature of the plastics and the type of container to be made. The various processes used are as follows.

4.1 Blow Moulding

4.1.1 This process is suitable for containers of any size with either open, closed, threaded or plain necks.

4.1.2 In extrusion blow moulding, two main steps are involved; the first entails the extrusion of a tube of thermoplastics melt known as a 'parison'. The second step is the inflation of the 'parison' in a mould of the desired shape and size.

4.1.3 In injection blow moulding, the melt is injected into a tubular cavity surrounding a spigot which acts as a blowing nozzle. The spigot with the hot melt is then transferred to a split mould and blown so that the melt now takes the shape of the mould cavity.

*Glossary of terms in plastic and flexible packaging, excluding paper (*first revision*).

†Glossary of terms used in plastic industry.

4.1.4 The tolerance on the various dimensions, capacities and mass of containers are covered in IS : 7408-1974*.

4.1.5 *Stretch Blow Moulding* — In this process an extruded or injection moulding preform is stretched in both directions for biaxial orientation in a blow moulded container to impart much improved physical and mechanical properties. The materials commonly used are PVC and PET.

4.1.6 *Co-extruded Blow Moulding* — In this process more than one polymer, such as SAN and PET, are used to form a parison for blow moulding.

4.2 Injection Moulding — This process is used for the production of thin-walled or thick-walled containers with open necks. In the injection moulding process, heat softened thermoplastics is forced into a mould by pressure and allowed to cool. The process may use single cavities or a mould containing many cavities. This process is also used for manufacture of transport container such as bottle crates.

4.3 Thermo-forming — In this process, heat softened sheet material is made to conform to a mould profile by using vacuum, pressure or mechanical aids. Different variations of forming in which combinations of vacuum, pressure and mechanical aids are used, have been developed in order to ensure more even material distribution.

4.4 Extrusion — This is used for the production of seamless thin-walled parallel sided containers. In the extrusion process a thermoplastic is softened by heat and pressure. The melt thus obtained is extruded through a sizing die after which it travels through a cooling zone, so as to retain its dimensional cross section.

4.5 Rotational Moulding — This process is a form of powder sintering in which plastics powder is introduced into a heated hollow metal mould which is then rotated in horizontal and vertical planes either in separate stages or simultaneously. The powder melts and takes the shape of the mould interior and is cooled before extraction as a complete moulding.

4.6 Compression Moulding — Compression moulding of plastics is employed mainly with thermosetting materials. A quantity of the material in powder, pallet, or dough form is placed in the lower cavity of a heated mould and compressed by lowering the upper half. The material is thus subjected to heat and pressure which causes it to flow and fill the contours of the mould. Thermosetting materials harden quickly under these conditions and can be ejected without chilling the mould.

4.6.1 Transfer moulding is a modification of compression moulding whereby the material is first softened by heat in a chamber prior to being forced into a closed heated mould for final curing.

*Specification for blown polyolefin plastic containers (up to 5 litres).

4.7 Fabrication — Fabrication of thermoplastics can be carried out by welding or sealing, both of which rely on fusing or fluxing the mating surface generally under a certain amount of pressure. The heat shall be controlled to avoid marking, weakening or degrading the material and a number of methods have been developed to give the best results with different plastics and shapes. The following welding processes are applicable.

4.7.1 Friction Welding — A pressure welding process in which the surfaces to be united are softened by heat generated by friction.

4.7.2 Heated Tool Welding — A pressure welding process in which the surfaces to be united are softened by conduction or radiation of heat from heated tools.

4.7.3 High Frequency Welding (Dielectric Welding) — A pressure welding process in which the surfaces to be united are softened by heat produced by a high frequency field.

4.7.4 Hot Gas Welding — A pressure welding process in which the surfaces to be united are softened by a jet of hot air or inert gas produced by a welding torch.

4.7.5 Hot Wire Welding — A welding process which utilizes a heated wire to weld and at the same time sever, films of plastics material; mainly confined to polyolefins.

4.7.6 Impulse Welding — A pressure welding process in which the surfaces to be united are subjected to rapid heating followed by cooling, pressure being maintained over the whole of the cycle.

4.7.7 Induction Welding — A welding process in which the surfaces to be united are softened or melted by heat transfer from an electrical conductor embedded in the thermoplastics. The conductor is heated by the current induced by an alternating magnetic field.

4.7.8 Molten Bead Welding — A welding process in which the thermoplastic material at the joint is melted by the transfer of heat from an extruded bead on to the overlapping sheets.

4.7.9 Flame Welding — An edge welding process using a finely tipped flame for the heating of thermoplastic material, followed by cooling under pressure exerted by rollers. This process is applied to thermoplastic films with a definite melting point such as polyolefins.

4.7.10 Ultrasonic Welding — A friction welding process in which the friction is inter-molecular and is set up by ultrasonic vibration.

4.7.11 Pressure Welding — Any welding process in which the weld is made by sustained pressure while the surfaces to be united are in a softened condition.

4.7.12 Seam Welding — A pressure welding process which forms a continuous welded seam in which the surfaces to be united are softened either by heat produced by a high frequency field or by a conduction of heat from heated rollers or bars. The pressure may be applied continuously by rollers or progressively as in stitch welding.

5. METHODS OF TEST

5.1 The characteristics to be tested and the methods of tests to be used for plastic containers will depend upon the type of containers. For details of these reference may be made to Part 8 of the Code. Reference may also be made to IS : 2798-1964* and IS : 7551-1975†.

6. TYPES OF CONTAINERS

6.0 As the shape and construction of the container largely governs its suitability for a specific purpose, the following examples of the types available, with a brief description of the properties specific to the particular construction is intended to assist users in making their choice.

6.1 Trays and Dishes

6.1.1 These are suitable for holding solids and semiliquids (see Fig. 1).

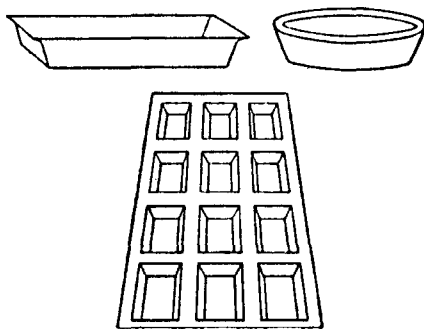


FIG. 1 TRAYS AND DISHES

*Methods of test for polyethylene containers.

†Methods of test for compatibility of plastic containers.

6.1.2 Decoration may be achieved by any of the following methods:

- a) Printing,
- b) Hot stamping, or
- c) Labels.

6.1.3 Closures are not normally used but if required a cover can be affixed by:

- a) external or internal push fit,
- b) heat-sealing or high frequency welding or the use of adhesives, or
- c) shrink-wrapping

6.2 Jars, Pots and Tubs

6.2.1 These are available in a wide variety of shapes and are suitable for packaging solids, semisolids, liquids and powders. They provide tough rigid packaging in lightweight material (see Fig. 2).

6.2.2 *Closures may consist of :*

- a) metal or plastics screw cap,
- b) plastics paper or foil membrane mechanically fixed or sealed, or
- c) external or internal push-fit.

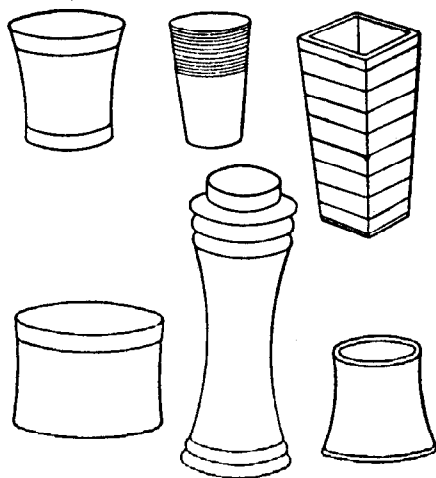


FIG. 2 JARS, POTS AND TUBS

6.2.3 Other Features — These containers may be made with double walls for special uses.

6.3 Squeeze Tubes

6.3.1 These are usually employed for creams, lotions, pastes and other semi-solids. These tubes are usually supplied by the manufacturer with the dispensary closure applied. They are usually filled from the open end and then closed by an appropriate welding technique (*see Fig. 3*).

6.3.2 Closures are either:

- a) plastics screw caps, or
- b) push on caps.

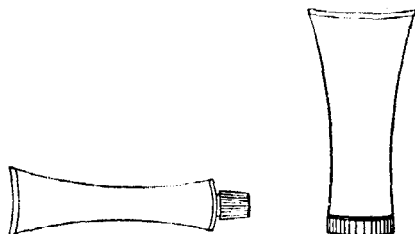


FIG. 3 SQUEEZE TUBES

6.4 Bottles — Closures of many types are employed to provide a range of functions including spraying, foam making and dispensing. Simple screw-on closures or caps attached by a strap are popular, whilst internal secondary plugs and heat-sealing foils are used (*see Fig. 4*, and IS : 8688-1977* and IS : 9754-1981†).

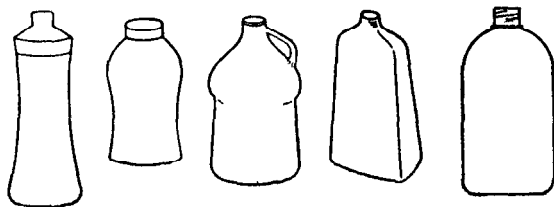


FIG. 4 BOTTLES

6.5 Sleeves and Cylinders — Closures are provided by:

- a) external or internal push fit cap,
- b) adhesives, or
- c) appropriate welding technique (*see Fig. 5*).

*Specification for polyethylene potable water bottles.

†Specification for high density polyethylene containers for packing of liquid pesticides (up to 1 litre capacity).

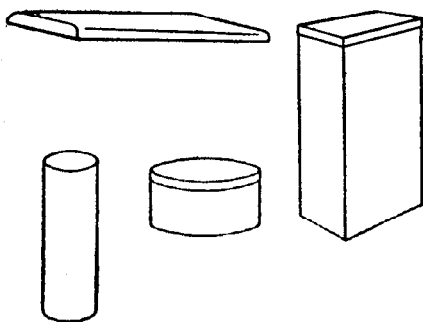


FIG. 5 SLEEVES AND CYLINDERS

6.6 Boxes

6.6.1 These are used for solids and powders and decoration achieved by means of:

- a) printing,
- b) labels, or
- c) hot-stamping or a combination of these methods.

6.6.2 Closures may be achieved by:

- a) push fit cap,
- b) adhesives, or
- c) appropriate welding technique (*see* Fig. 6).

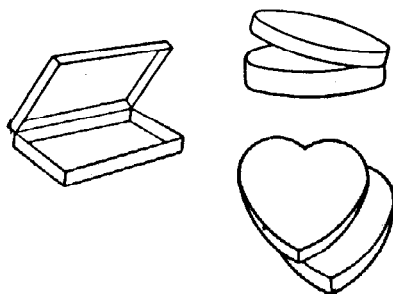


FIG. 6 BOXES

6.7 Plastics Crates — Plastics crates are being increasingly used for industries such as dairy, soft drinks, etc. The dimensional stability, resistance to drop, applied load and low temperature are the factors, which

require consideration. For details of glass milk bottle crates *see* IS : 9907-1981*.

6.8 Transport Containers — These unsupported drums, in a range of capacities from approximately 9-200 litres, are suitable for the transportation and storage of wide range of liquids (and solids) which require special precautions to guard against acidic or rust corrosion. They are usually made by either a blow moulding or a sintering process (*see* Fig. 7A, 7B & 7C and IS : 6312-1980†).

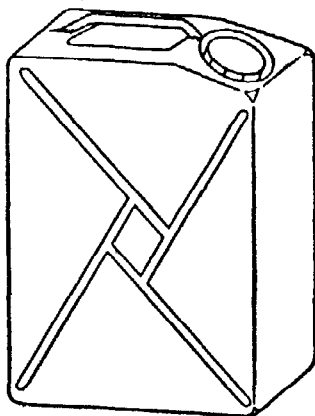


FIG. 7A RECTANGULAR CONTAINER

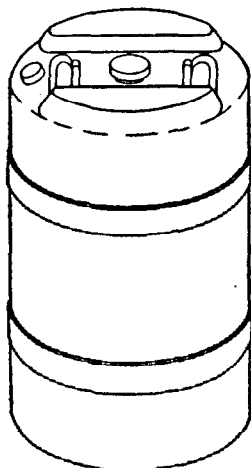


FIG. 7B CYLINDRICAL DRUM

*Specification for high density polyethylene (HDPE) crates for 500 ml glass milk bottles.

†Specification for polyethylene containers for transport of materials (*first revision*).

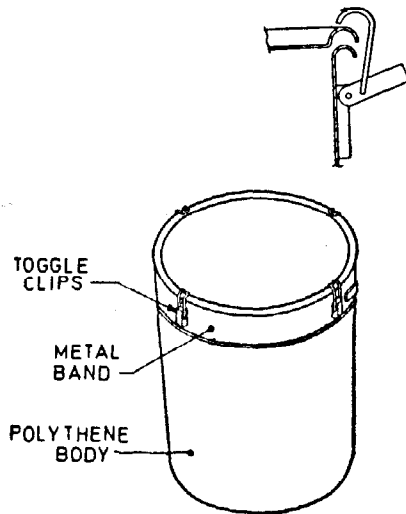


FIG. 7C FULL-OPEN DRUM

6.9 Semi-rigid Carboys — These are similar to the transport containers in size range, methods of manufacture and end-use. They are capable of containing the contents, but for movement require the support of an external case, crate or drum, (see Fig. 8A, 8B and 8C).

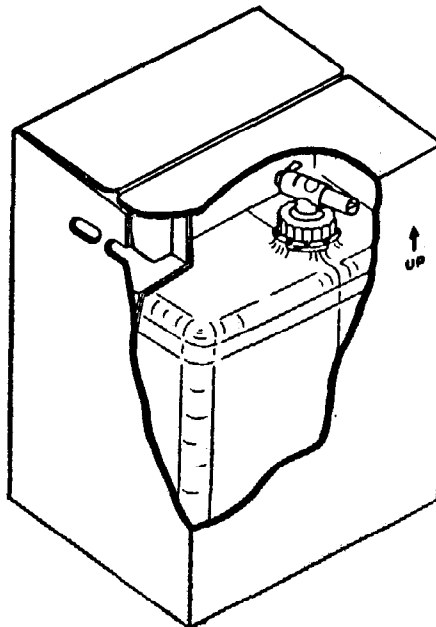


FIG. 8A IN FIBREBOARD CASE

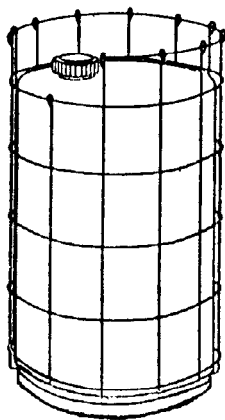


FIG. 8B DRUM IN WIRE HAMPER

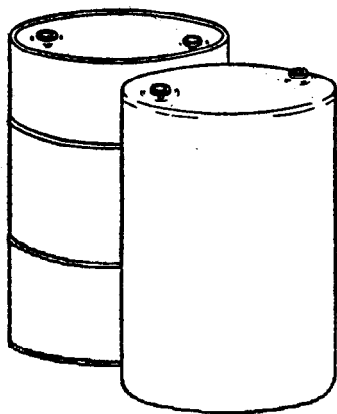


FIG. 8C CONTAINER IN METAL DRUM

A P P E N D I X A

(Clause 0.4)

**LIST OF INDIAN STANDARDS RELATED TO
PLASTIC PACKAGING****a) Plastics Materials**

IS :

867-1963	Methods of test for phenolic moulding materials (<i>revised</i>)
1300-1966	Phenolic moulding materials (<i>second revision</i>)
2267-1972	Polystyrene moulding materials (<i>first revision</i>)
2508-1977	Low density polyethylene films (<i>first revision</i>)
2530-1963	Methods of test for polyethylene moulding materials and polyethylene compounds
2543-1964	Cellulose acetate moulding and extrusion materials
3371-1980	Di- <i>n</i> -butyl phthalate (<i>first revision</i>)
3389-1965	Urea-formaldehyde moulding materials
3395-1965	Low density polyethylene materials for moulding and extrusion
3669-1966	Melamine formaldehyde moulding materials
3672-1980	Di-octyl phthalate plasticizers (<i>first revision</i>)
5210-1969	High impact polystyrene sheet
6307-1971	Rigid PVC sheets
6627-1980	Dimethyl phthalate plasticizer (<i>first revision</i>)
7166-1974	Cellulose acetate flakes
7188-1974	Methods of test for cellulose acetate flakes
7328-1974	High density polyethylene materials for moulding and extrusion
9572-1980	Benzyl butyl phthalate plasticizer
9766-1981	Flexible PVC compounds

b) Plastics Containers

2798-1964	Method of test for polyethylene containers
6312-1980	Specification for polyethylene containers for the transport of materials (<i>first revision</i>)
6604-1972	Code for packaging solid pesticides (up to 500 g)
7019-1982	Glossary of terms in plastic packaging

IS : 10106 (Part 4/Sec 3) - 1984

IS :

- 7394-1974 High density polyethylene containers (jerry cans) for petroleum reserve fuel with nominal volume up to 5 litres
- 7408-1974 Blown polyolefin plastics containers (up to 5 litres capacity)
- 7551-1975 Method of test for compatibility of plastic containers
- 7792-1975 Code of practice for handling plastic containers
- 7803 (Part 1)-1975 Plastic containers for pharmaceutical use: Part 1
Other than parenteral and ophthalmic preparations
- 7803 (Part 2)-1975 Plastic containers for pharmaceutical use: Part 2
Parenteral and ophthalmic preparations
- 7959-1976 Polyethylene jerry cans for foam compounds
- 8688-1977 Polyethylene potable water bottles
- 8747-1977 Methods of test for environmental stress crack resistance of blow-moulded polyethylene containers
- 9738-1981 Specification for polyethylene bags for general purposes
- 9754-1981 Specification for high density polyethylene containers for packing of liquid pesticides (up to 1 litre capacity)

c) Related Indian Standards

- 2828-1964 Glossary of terms used in the plastics industry
- 7277-1974 Code of practice for safe use of polyethylene in contact with foodstuffs, pharmaceutical and drinking water
- 7288-1974 Code of practice for safe use of polyvinyl chloride (PVC) and its copolymers in contact with foodstuffs, pharmaceuticals and drinking water
- 7961-1976 Code of practice for safe use of styrene polymers in contact with foodstuffs, pharmaceuticals and drinking water
- 9833-1981 Classification of pigments and colourants for use in plastics in contact with foodstuffs, pharmaceuticals and drinking water